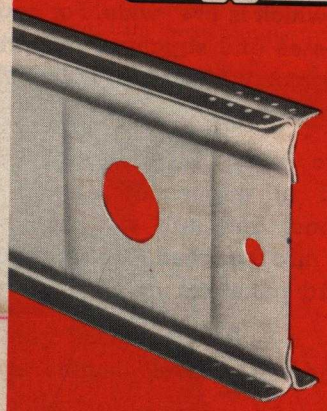
STRAN-STEEL
NAILABLE FRAMING

YOU NAIL TO STRAN-STEEL FRAMING



TYPICAL JOIST

STANDARD STUD

NARROW STUD

CHANNEL PLATE

provides a versatile system for durable, fire-safe structures

- Apartment buildings
- Residences
- Commercial buildings
- Industrial buildings
- Light trusses for pitched or flat roofs
- Floor joists
- Interior partition studs, purlins, girts
- Loading platforms
- Suspended ceiling framing
- Mezzanine floors
- Interior structures within buildings
- Duct work framing and supports
- Tool crib framing

GREAT LAKES STEEL CORPORATION
STRAN-STEEL DIVISION
ECORSE, DETROIT 29, MICH.

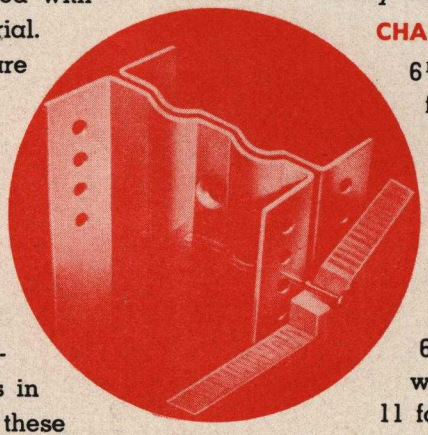
NATIONAL STEEL CORPORATION

NATIONAL STEEL

Stran-Steel–What It Is

THE DISTINCTIVE NAILING GROOVE—Distinctive feature of Stran-Steel framing is the "Nailing Groove." Because of this feature, fire-safe, economical and permanent steel construction can now be applied to all types of light occupancy structures.

The "Nailing Groove," found in all Stran-Steel joists and studs, as illustrated, is obtained by welding two or more specially formed steel parts back to back. The small space between these parts is so designed that a nail driven into this space is not only gripped by steel but is also deformed, utilizing to the utmost a holding power that cannot be duplicated with any other type of building material. In this manner collateral materials are attached directly to the steel framework by the ordinary hammer-and-nails method. Stran-Steel framing can be assembled by means of sheet metal screws, bolts, nails or by welding.



Stran-Steel framing and accessories are available through fabricating dealers and distributors established at locations providing convenience to builders in any part of the country. By means of these facilities, all members can be engineered and fabricated to fit the requirements of any job or project anywhere.

FORMED OF STRIP STEEL — Strip steel, from which all Stran-Steel members are formed — is produced in strip mills in the form of continuous coils, several thousand feet in length. Any specified thickness or gauge ranging from 1/32" (23 U. S. Std. Ga.) to 3/16" (7 U.S. Std. Ga.) can be produced merely by adjusting the rolls to suit the desired thickness.

With such a wide variety of thicknesses or gauges from which to choose, it is a simple matter for the architect or engineer to hold the weight of members to a minimum consistent with load requirements. This saving in steel results in savings to the builder!

VERSATILITY — Any light-occupancy building up to and including three stories in height can be economically framed with Stran-Steel members for floors, roofs, bearing and non-bearing walls and partitions.

As illustrated elsewhere, Stran-Steel framing has been used successfully in residences, multiple dwellings, commercial and light industrial buildings since 1933, and in thousands of complete buildings which served America at war. Among the latter are the famous Stran-Steel framed arch-rib Quonset buildings.

Stran-Steel Members

JOISTS — Manufactured in three depths: 6", 8" and 9", all with 2" wide flange at top and bottom. For gauge thicknesses and structural properties see engineering data on page 11.

STUDS — Manufactured in three depths: 3⅝", 2-5/16" and 2". Flanges for 3⅝" and 2-5/16" studs are 2" wide, top and bottom; 2" stud flanges are 1¾" wide. For gauge thicknesses and structural properties see engineering data on page 11.

HALF STUD — Manufactured 1-11/16" deep with one 2" wide flange, in 16-gauge only. It is used as an auxiliary nailing member.

CHANNELS—Manufactured in four depths: 6¼", 3-13/16", 2½" and 2⅛". Channel flanges are 1⅝" wide except for 2⅛" channel which is 1¼" wide. For gauge thicknesses and structural properties see engineering data on page 11.

STANDARD PUNCHING — Stran-Steel members may be obtained prepunched or unpunched except the 6¼" channel and half stud members which are not punched. Consult page 11 for standard punching.

STANDARD LENGTHS: — All Stran-Steel framing members may be obtained in various lengths up to and including 30 feet.

PRECUTTING — On 5,000 feet or more of Stran-Steel framing members of the same length and gauge, the manufacturer will cut to length at the mill at no added cost.

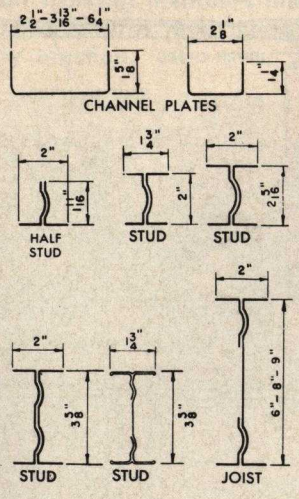
ACCESSORIES — All necessary accessories for the proper erection of Stran-Steel members are obtainable with each job: bridging, joists, hangers, C-clips, header-brackets, half-stud trimmers, combination clips, rafter plates, hip and valley collars, rafter hinges, collar-tie brackets, self-threading screws and bolts.

FINISH — Stran-Steel members and attachments are painted with a heavy baked-on coat of special rust-resisting paint. This protective coating is tough and very adhesive. It will not chip, and resists scratching in handling and erection.

STEEL QUALITY — Steel used for Stran-Steel members conforms to A.S.T.M. Serial Designation A 303-48T open hearth, copper bearing Grade C, except that minimum yield point, however, is 40,000 pounds per square inch instead of 33,000.

Advantages of Stran-Steel

DIMENSIONS OF TYPICAL MAIN MEMBERS



UNIFORM QUALITY — Complete control of all manufacturing operations from raw material to finished product insures uniformity in quality.

STRENGTH — Stran-Steel framing members have definite engineered strength characteristics. Carrying capacities and strength factors can be easily determined with precision. No allowance need be made for variables in strength usually found in other materials.

ECONOMY — The Stran-Steel framing system has demonstrated its economy in hundreds of thousands of buildings the world over. Its great strength-to-weight ratio results in the most economical use of material.

FIRE PROTECTION — Stran-Steel framing in itself is incombustible. When used in combination with non-inflammable covering or facing materials, a **fire-resistant type of construction may be obtained at lower cost.**

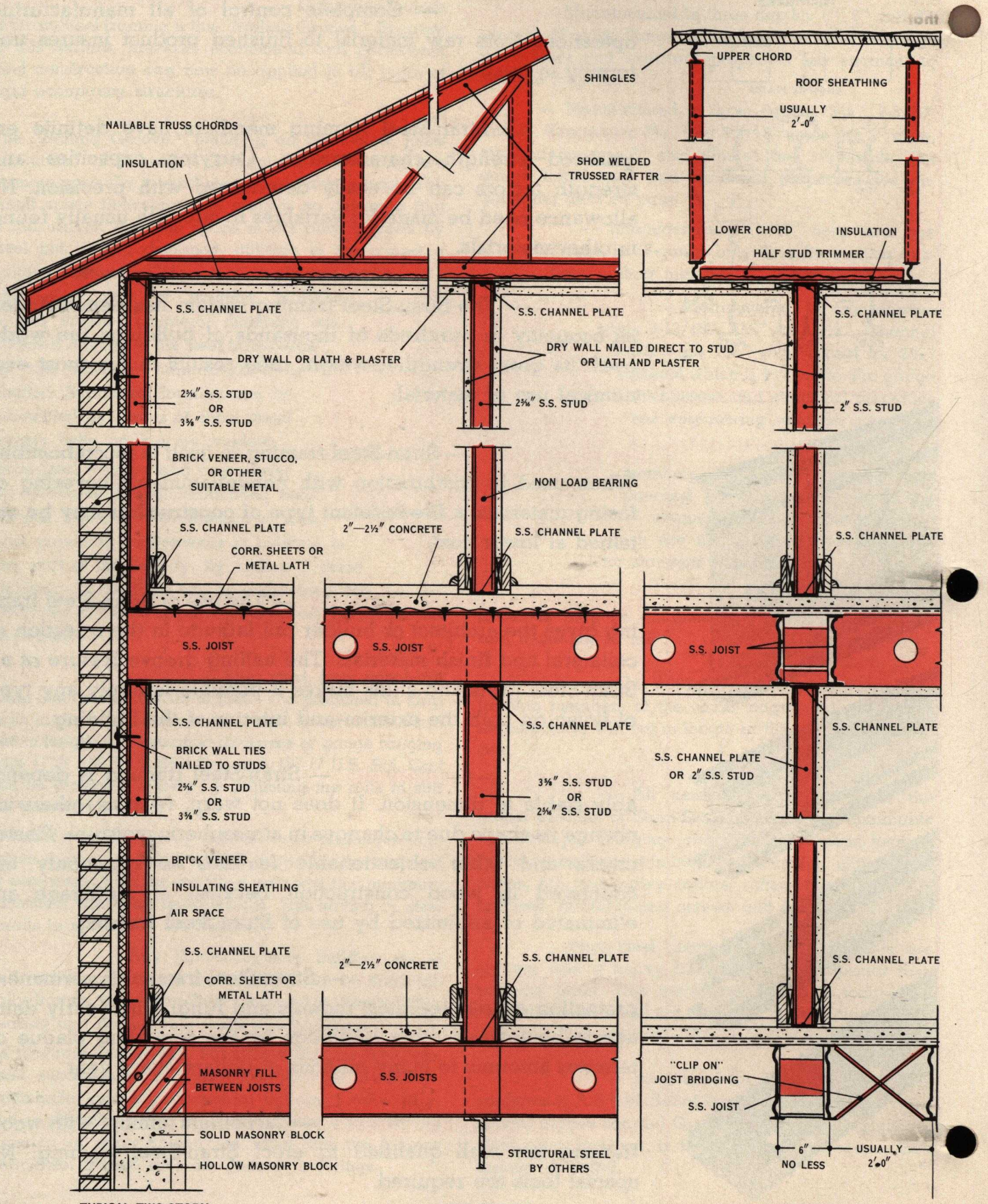
STANDARD COLLATERAL MATERIALS — The use of Stran-Steel framing gives the architect or builder full latitude in the selection of collateral and finish materials .The nailing groove feature of all Stran-Steel joists and studs makes it possible to apply any type of finish on both the exterior and interior of the building.

NO WARPING, NO SHRINKING — Stran-Steel framing is dependably stable in dimension. It does not warp, twist or otherwise change its shape due to changes in atmospheric moisture. Plaster cracks and other objectionable features so commonly encountered in wood construction because of shrinkage are eliminated or minimized by use of Stran-Steel framing.

FUNGI-PROOF, TERMITE-PROOF — Stran-Steel framing is permanent protection against termites, rodents and fungi. The yearly damage to homes and other buildings by the spreading plague of termites amounts to many millions of dollars every year.

CARPENTERS QUALIFIED TO ERECT — Carpenters familiar with wood framing are well qualified to erect Stran-Steel framing. No special tools are required.

Typical Sections



TYPICAL TWO-STORY EXTERIOR WALL

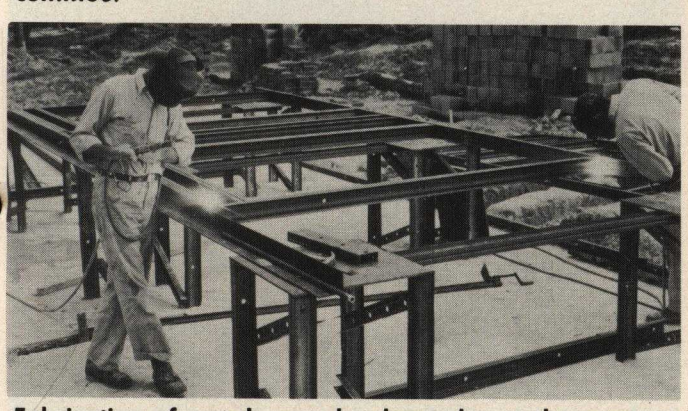
LOAD BEARING PARTITION

NON-LOAD BEARING PARTITION

Erection Methods

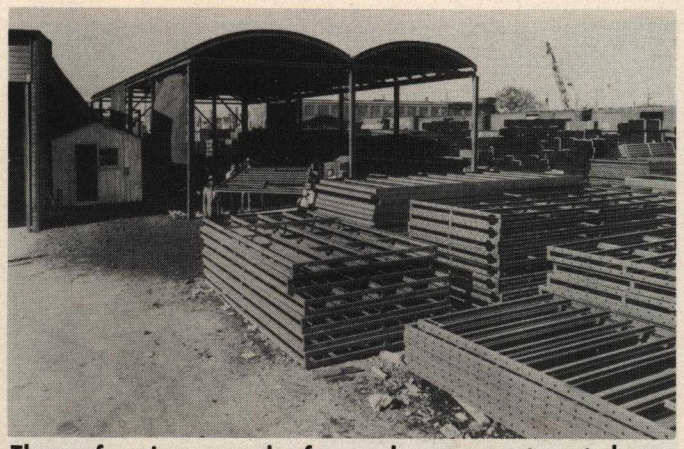
Stran-Steel framing is very simple to erect. The fact that all framing members may be delivered to the job in exact lengths and completely fabricated assures speedy erection.

Shop fabrication of panels, as shown here, increases labor efficiency. While inclement weather may stop other construction work, this shop fabrication can continue.

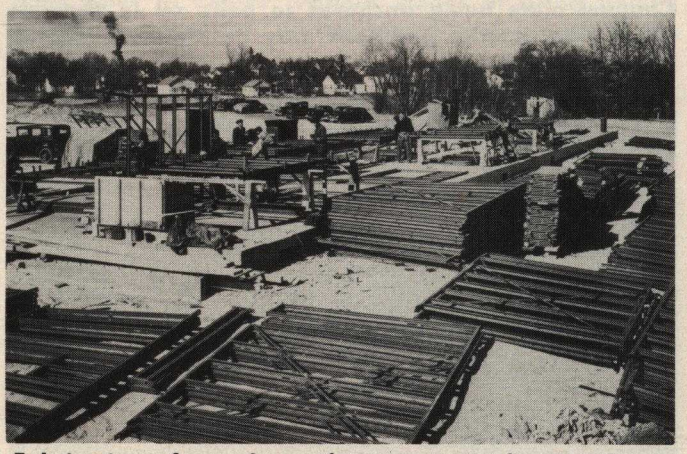


Fabrication of panels may be done also at the construction site. Notice that the jig tables are made of Stran-Steel framing.

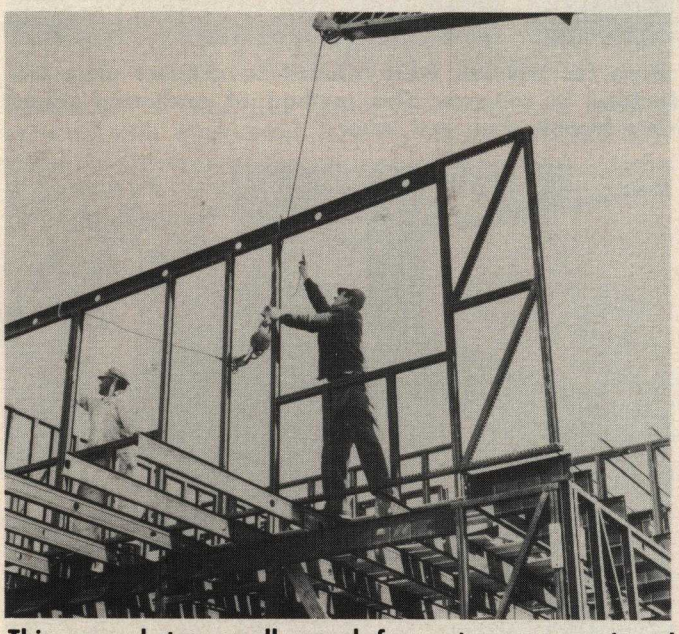
Shop or site - fabricated roof trusses for a residence job ready for quick erection.



These framing panels for a large apartment house project were fabricated by the Stran-Steel framing dealer and trucked to the job. Panel fabrication kept well ahead of the erection crews.



Fabrication of panels on this apartment house job was done on the first floor of one of the buildings.

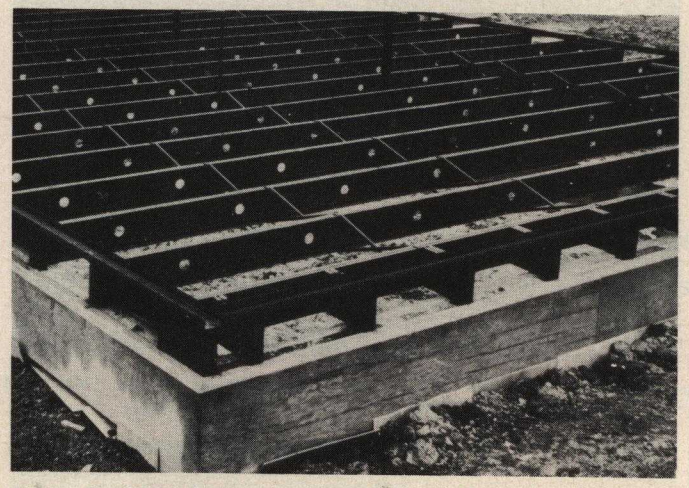


This second-story wall panel for a terrace apartment job is being quickly put in place by use of a derrick and two men.

Erection Methods

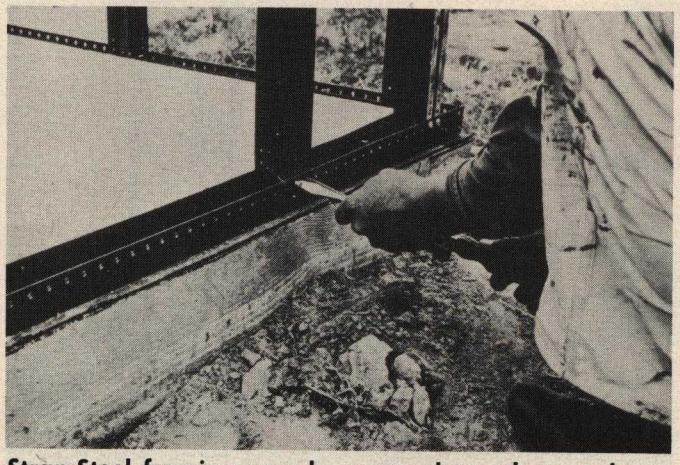
Channel plate being anchored to bolts set in concrete foundation. Interior partitions may be rapidly anchored by gun fired studs.

C-clips anchor joists together by simple nailing. Notice simple type of quickly-installed lock-bridging.

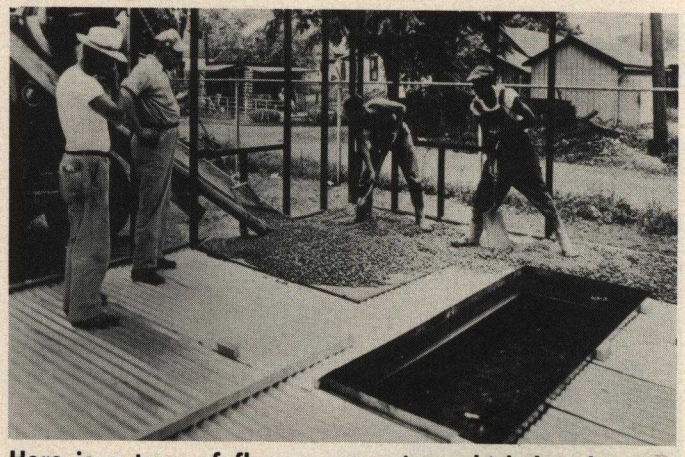


Joists for this job were welded to channel plate imbedded in concrete. This method of anchoring saved considerable time and labor.

Bricking-in between Stran-Steel floor joists follows the same principles of construction used with other types of framing material.

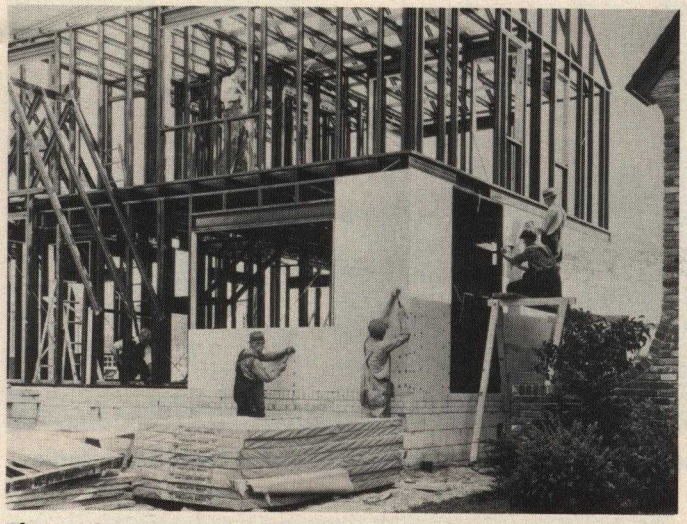


Stran-Steel framing may be screwed together as shown here. This method of erection was followed for many years, but welding has now become a more common practice.

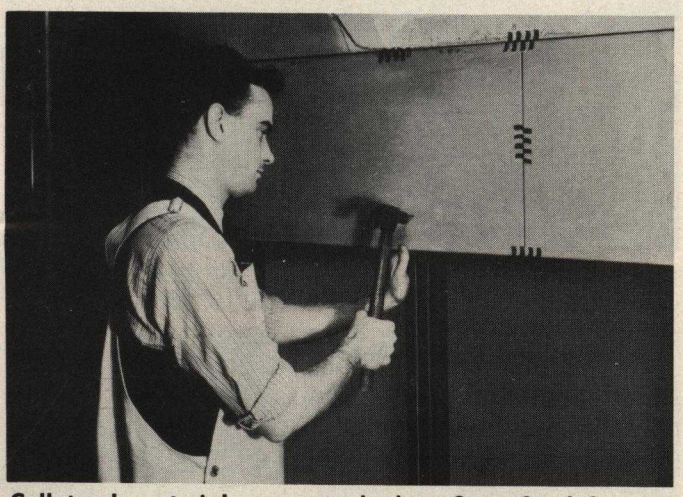


Here is a type of floor construction which has become popular with builders using Stran-Steel joists. Corrugated sheets are nailed directly to joists. The resulting platform, or deck, can be used by workmen immediately, as a working floor. Then concrete, usually about two inches thick, is poured on corrugated sheets.

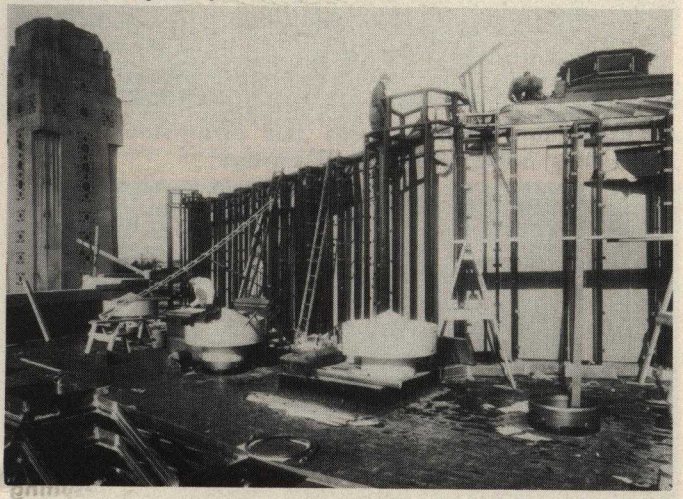
Erection Methods



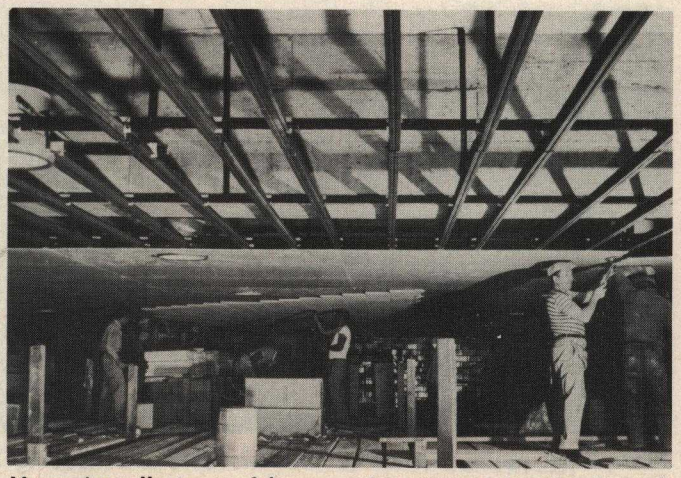
The nailing groove in Stran-Steel framing makes it easy to apply insulating board and other collaterals. Usual carpentry practices are followed, neither special skills nor special tools are necessary.



Collateral materials are attached to Stran-Steel framing easily and quickly without waste.

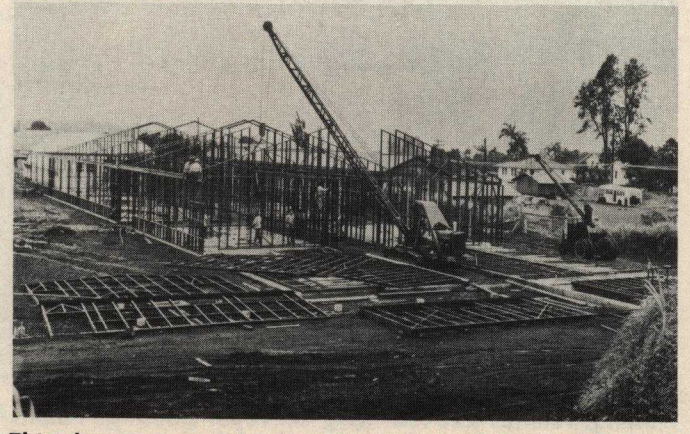


Stran-Steel framing is adaptable to special types of wall construction. It is being used here for architectural decoration in a nationally known shrine.



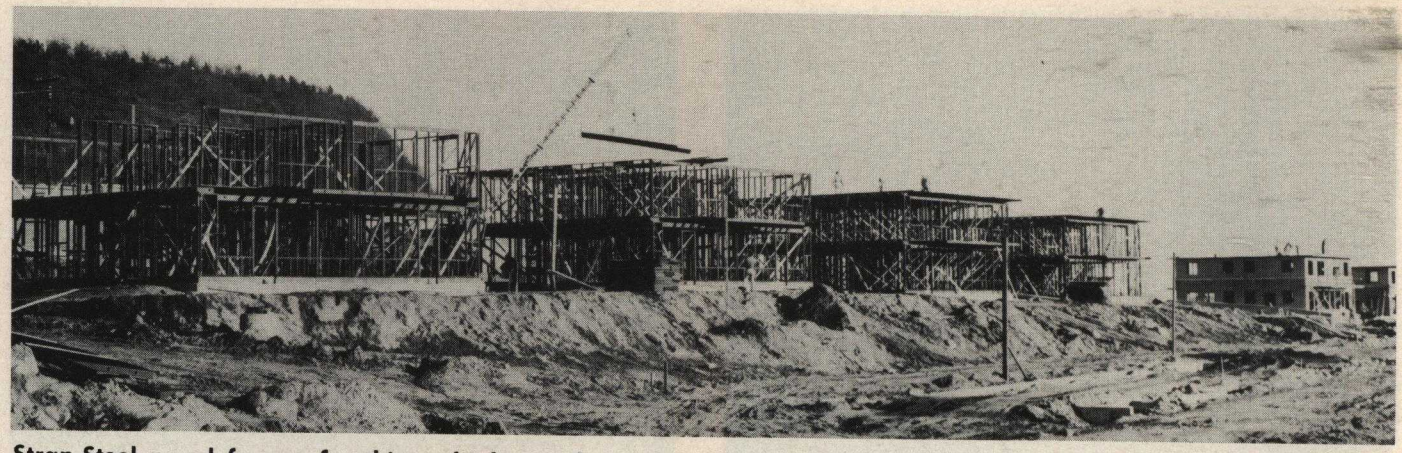
Many installations of hung ceilings are constructed with Stran-Steel framing. Metal clips hold 2-5/16" x 2" Stran-Steel studs to angles. Various stages of using nailing groove for applying plaster board and acoustical tile are shown here.

Installation of electrical wiring, plumbing and heating systems with Stran-Steel framing follows normal construction practices of the various building trades. Holes to receive pipe and wiring are factory punched in framing members.

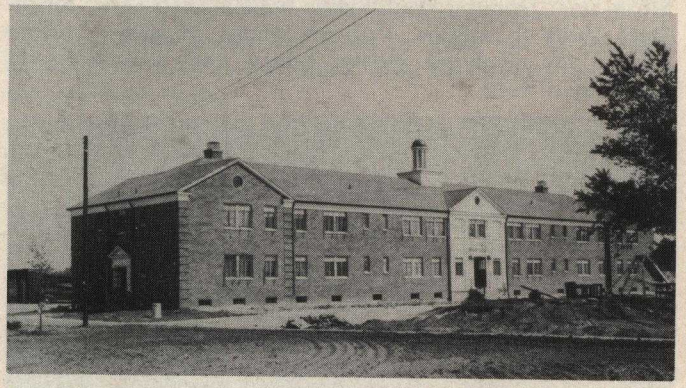


This shows second-day framing progress on a school job in Hawaii.

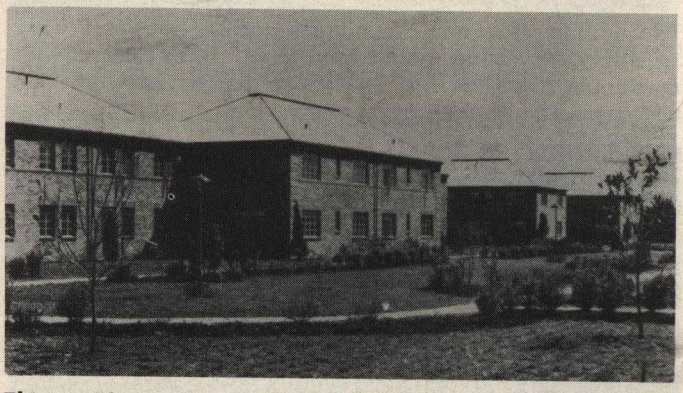
Typical Examples



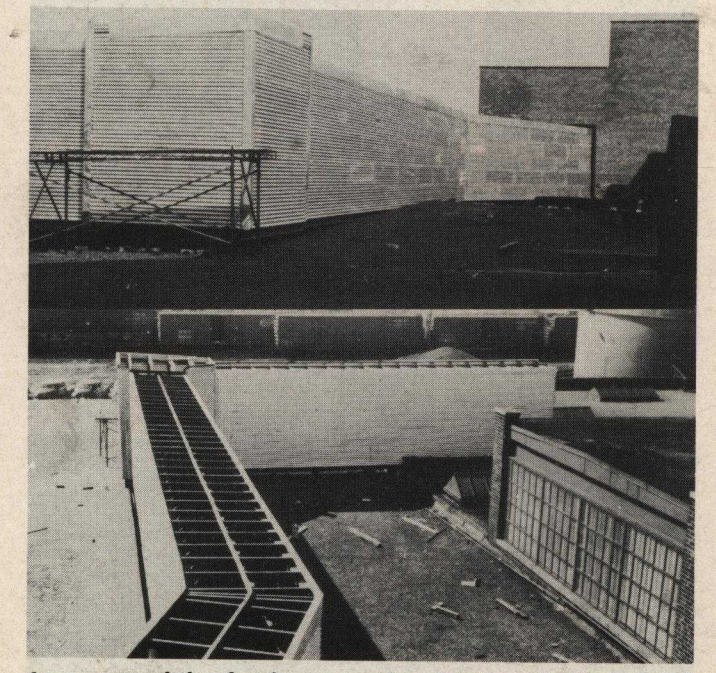
Stran-Steel panel frames for this multiple-unit housing project were fabricated in the shop of the Stran-Steel dealer and delivered by truck to the job.



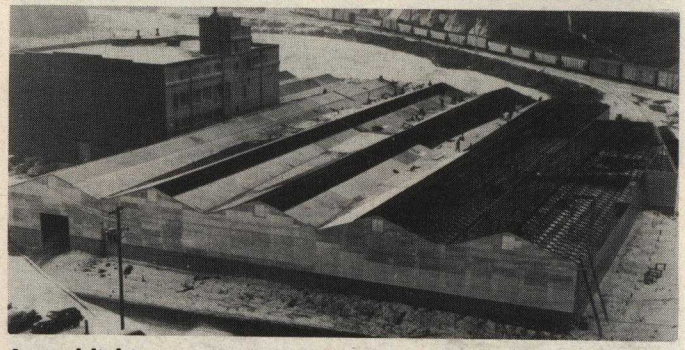
Stran-Steel framing was used in 11 apartment buildings constructed at a state university for faculty members. Above is one of the buildings.



This garden terrace apartment building was constructed with Stran-Steel framing more than 10 years ago.



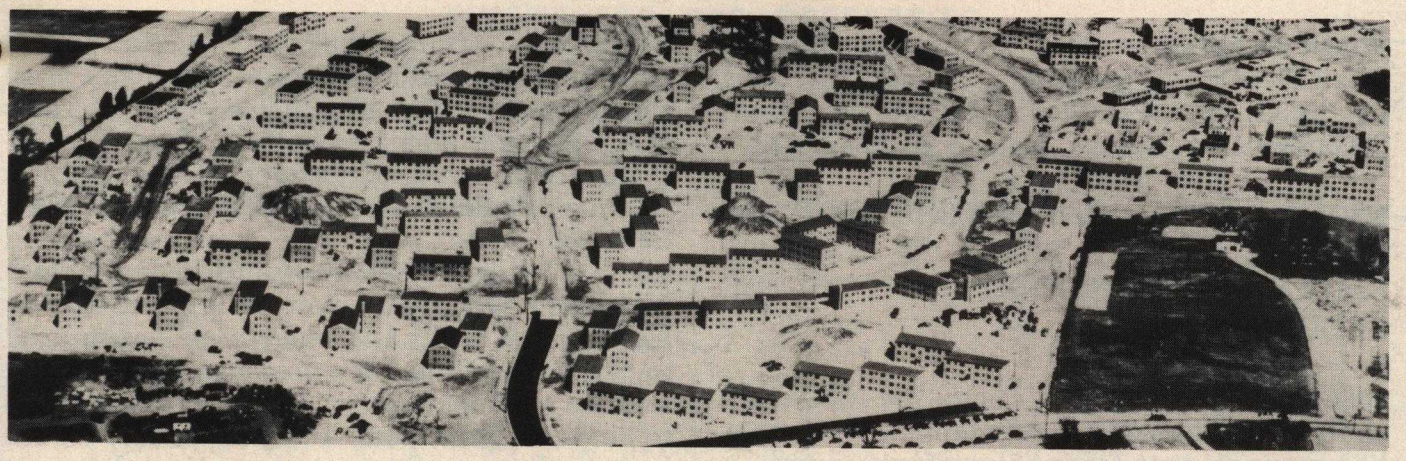
An automobile fender manufacturer used Stran-Steel framing for this 220-foot long conveyor housing. Panels were fabricated in shop of dealer and assembled on the job.



A publishing company uses this Stran-Steel framed 290′ x 310′ building for paper storage.

Fire-resistant Stran-Steel trusses were put to good use by a lumber dealer for his warehouse.

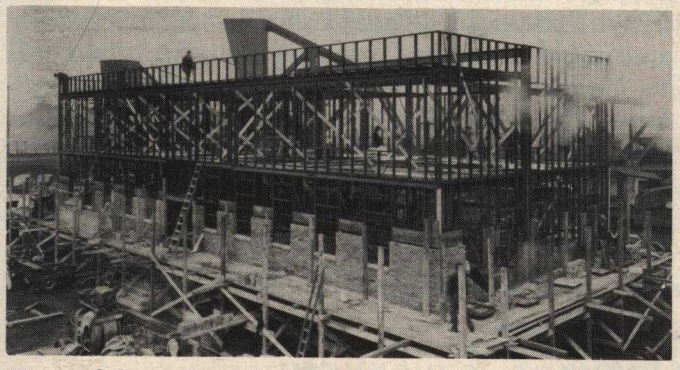
Typical Examples



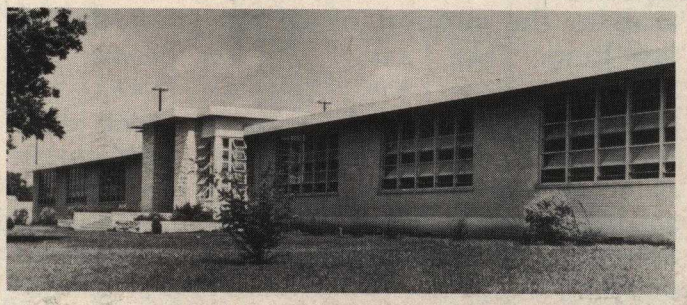
This 2100-unit housing project in the Washington, D.C., area uses Stran-Steel floor joists exclusively.

Low postwar rental rates were offered for this Washington project featuring a fire-safe Stran-Steel floor system and other quality features.

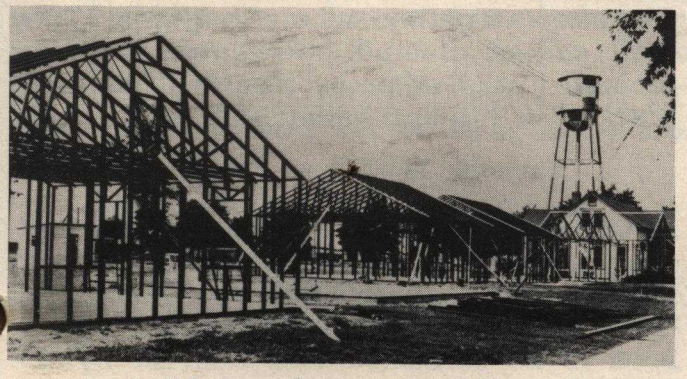
An exclusive resort hotel in Wisconsin is constructed with Stran-Steel framing.



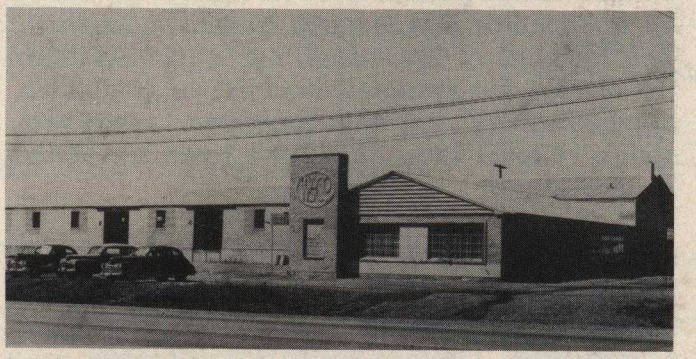
View of Stran-Steel framing in a commercial building.



Its fire-resistance and complete protection against termites and fungi at a relatively low cost has made Stran-Steel framing popular for use in many schools. Photo shows a Stran-Steel framed school in Texas.



U.S. Navy homes in Norfolk.



A building material dealer in State of Washington specified Stran-Steel framing and steel sheets for this modern building.

Specifications

WORK INCLUDED — Shall be the furnishing of Stran-Steel joists, studs, etc., as manufactured by the Great Lakes Steel Corporation, Stran-Steel Division, Ecorse, Detroit 29, Michigan.

SHOP PAINTING — ALL FRAMING MEMBERS SHALL BE GIVEN A BAKED ON COAT OF SPECIAL RUST-RESISTING PAINT AT THE SHOP.

ERECTION OF FRAME — Shall be done by skilled mechanics in a substantial, workmanlike manner, true to line, level and plumb.

JOISTS — Throughout shall be of sizes determined by live load and dead load requirements or as recommended by the manufacturer. Double all joists or provide heavier gage single joists of proper carrying capacity under partitions and around all floor openings for stairs, chimneys, etc. DOUBLE JOISTS SHALL BE FASTENED TOGETHER WITH C-CLIPS.

JOIST HANGERS — Stran-Steel joist hangers shall be provided for the support of headers and for the support of all tail joists over 5 feet long.

CROSS BRIDGING — As soon as steel joists have been erected and before application of construction loads, bridging shall be installed between them. This bridging shall be adequate to safely support the top chords or flanges against lateral movement during the construction period and shall hold the steel joists in an approximately vertical plane passing through the bearings. The steel joists at the ends of panels shall be braced laterally by anchors or ties at each line of bridging. The number of lines shall be: one row, near the center, for spans up to 14 feet; two rows, approximately one-quarter span apart, for spans 14 to 21 feet; and three rows for spans 21 to 32 feet.

CHANNEL PLATES — To fit studs shall be provided as sills and plates for all exterior wall studding, all interior partitions and elsewhere as required. Channels shall be lapped and fastened with 2 screws at all corners or butt welded.

STUDDING — Studs shall be provided for all exterior walls and interior partitions and shall be secured to sills and plates with 4 screws each, 2 at top and 2 at bottom through diagonally opposite stud flanges or by welding flanges to sills and plates. Provide jack studs between main wall sills and plates and window sills; between window and door lintels or headers and main wall plates above; for all gable walls and elsewhere as required to provide nailing for enclosing exterior and interior wall material or finish. Provide studs to serve as jam studs at all openings where main wall or partition stud spacing does not fulfill requirements.

OPENING SILLS AND HEADERS — Shall be provided as required for all exterior and interior wall and partition openings and headers shall be secured by header brackets or by welding to supporting studs.

RAFTERS—Shall consist of stud or joist members, depending on the span and loads supported. The heel of each rafter shall be secured at the wall to the wall plate with a loose pin rafter hinge or other suitable connector by means of screwing or welding. Rafters shall be secured at the ridge by cutting away adjacent lower flanges and bolting together through webs of rafters or by direct butt welding of mitred members. Jack rafters shall be secured at heels as specified for main rafters and at hip and valley rafters with hip and valley collars and rafter plates or by welding.

COLLAR TIES — Shall be provided to brace and tie rafters together where required. They shall consist of stud or channel members secured to the rafter by means of collar tie brackets or hip and valley collars.

ANCHOR BOLTS — Sills for exterior wall studding on masonry walls shall be secured to the masonry with ½" diameter hook bolts spaced approximately 4' on centers; anchor bolts to be furnished and built in by the masonry contractor.

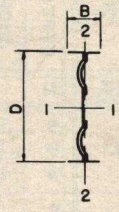
ENGINEERING DATA
STANDARD STRAN–STEEL SECTIONS

DIMENSIONS AND PROPERTIES

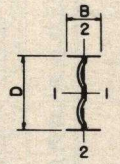
SIZE	NOMINAL GAGE	THICKNESS OF METAL	WEIGHT PER FOOT	DEPTH	FLANGE WIDTH	AREA OF SECTION	COLUMN FACTOR	ABOUT MAJOR AXIS 1-1			ABOUT MINOR AXIS 2-2			AXES OF MEMBERS
				D	B		Q	I	S⊕	r	I	S⊕	r	X
INCHES	NO.	INCHES	LB.	IN.	IN.	SQ. IN.		IN.⁴	IN.³	IN.	IN.⁴	IN.³	IN.	IN.
JOISTS														
9	16	.062	3.39	9	2	.981	.80	10.992	2.443	3.348	.093	.093	.306	
	14	.078	4.24	9	2	1.218	.83	13.620	3.027	3.341	.118	.117	.308	
	13	.094	5.11	9	2	1.463	.86	16.221	3.605	3.333	.143	.141	.311	
	12*	.109	5.85	9	2	1.682	.88	18.759	4.169	3.326	.169	.167	.313	
8	16	.062	3.17	8	2	.918	.84	8.219	2.055	2.992	.090	.089	.313	
	14	.078	3.97	8	2	1.140	.88	10.178	2.545	2.984	.113	.112	.315	
	13*	.094	4.78	8	2	1.369	.90	12.112	3.028	2.977	.138	.135	.317	
	12*	.109	5.47	8	2	1.573	.91	14.000	3.500	2.970	.163	.160	.320	
6	16	.062	2.74	6	2	.793	.94	3.928	1.309	2.228	.092	.089	.336	
	14*	.078	3.42	6	2	.982	.96	4.855	1.618	2.225	.115	.112	.338	
STUDS														
3 5/8	16	.062	2.28	3 5/8	2	.660	1.00	1.163	.641	1.327	.090	.086	.368	
2 5/16	18	.050	1.39	2 5/16	2	.400	.89	.314	.240	.886	.072	.061	.423	
	16	.062	1.73	2 5/16	2	.500	1.00	.393	.340	.886	.090	.086	.423	
2	20	.036	.86	2	1 3/4	.274	.80	.145	.116	.771	.033	.029	.367	
1/2 STUD	16	.062	1.08	1 11/16	2	.313	1.00	.098	.089	.561	.045	.043	.378	
PUNCHED CHANNELS														
3 13/16	16	.062		3 13/16	1 5/8	.369	.51	.828	.255	1.497	.080	THIS PROPERTY WHICH IS RARELY REQUIRED DEPENDS ON WHETHER THE WEB IS IN TENSION OR COMPRESSION	.465	.345
2 1/2	16	.062		2 1/2	1 5/8	.287	.56	.303	.143	1.028	.069		.492	.435
2 1/8	20	.036		2 1/8	1 1/4	.121	.33	.106	.036	.937	.018		.382	.359
UNPUNCHED CHANNELS														
6 1/4	16	.062	2.01	6 1/4	1 5/8	.582	.42	3.103	.584	2.309	.126		.465	.283
3 13/16	16	.062	1.49	3 13/16	1 5/8	.430	.51	.961	.297	1.497	.110		.506	.401
2 1/2	16	.062	1.20	2 1/2	1 5/8	.348	.56	.366	.172	1.026	.096		.526	.488
2 1/8	20	.036	.56	2 1/8	1 1/4	.162	.33	.123	.041	.871	.026		.404	.355
11/16	18	.050	.28	11/16	9/16	.081								

THE ABOVE CHANNELS ARE OFTEN USED IN PAIRS BACK TO BACK. WHEN ADEQUATELY FASTENED BACK TO BACK, THE RESULTING SECTIONS HAVE THE FOLLOWING PROPERTIES.

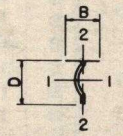
PUNCHED CHANNELS BACK TO BACK														
3 13/16	16	.062		3 13/16	3 1/4	.738	.51	1.656	.510	1.497	.248	.090	.579	
2 1/2	16	.062		2 1/2	3 1/4	.574	.56	.606	.286	1.028	.247	.090	.656	
UNPUNCHED CHANNELS BACK TO BACK														
6 1/4	16	.062	4.02	6 1/4	3 1/4	1.164	.42	6.206	1.168	2.309	.345	.125	.544	
3 13/16	16	.062	2.98	3 13/16	3 1/4	.860	.51	1.922	.594	1.497	.358	.130	.645	
2 1/2	16	.062	2.40	2 1/2	3 1/4	.696	.56	.732	.344	1.026	.358	.130	.717	



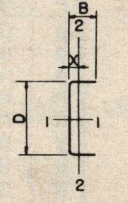
JOISTS



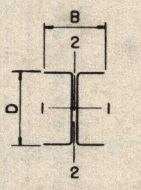
STUDS



HALF STUDS



CHANNELS



CHANNELS BACK TO BACK

ALL ABOVE MEMBERS ARE OF STEEL HAVING A MINIMUM YIELD POINT OF 40,000 P.S.I.

* AVAILABLE ONLY ON SPECIAL ROLLING

Q VALUES TABULATED ABOVE ARE FACTORS TO BE USED WHEN THE MEMBERS ARE SUBJECTED TO AXIAL COMPRESSION LOADS – SEE TABLE IV

⊕ THESE ARE REDUCED SECTION MODULI BY MEANS OF WHICH THE BEAM STRENGTH OF THE SECTION MAY BE COMPUTED DIRECTLY FROM THE FULL ALLOWABLE WORKING STRESS. THE RESULT WILL BE IN ACCORDANCE WITH A.I.S.I. SPECIFICATIONS, DATED APRIL 1946, FOR THE DESIGN OF LIGHT GAGE STEEL STRUCTURAL MEMBERS.

ENGINEERING DATA
SAFE UNIFORM LOAD TABLES FOR STRAN-STEEL JOISTS

TABLE I
ALLOWABLE UNIFORM
TOTAL LOAD
PER SQUARE FOOT
LIMITED BY EITHER
20,000 P.S.I. BENDING STRESS OR 3 1/2" END BEARING, WHICHEVER IS LEAST

TABLE II
UNIFORM LIVE LOAD
PER SQUARE FOOT
BASED ON DEFLECTION OF
1/360 OF SPAN

SPAN	SIZE OF JOISTS				ONE END REACTION	LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				UNIFORM LIVE LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				SPAN
	DEPTH	GAGE NUMBER	METAL THICK.	WEIGHT PER FT.		12" O.C.	16" O.C.	20" O.C.	24" O.C.	12" O.C.	16" O.C.	20" O.C.	24" O.C.	
FEET	IN.		INCHES	LBS.	LBS.									FEET
24	9	14	.078	4.24	840	70	52	42	35	43	32	26	21	24
	9	13	.094	5.11	996	83	62	50	41	51	38	31	25	
	9	12	.109	5.85	1164	97	73	58	48	59	44	36	30	
23	9	14	.078	4.24	874	76	57	46	38	49	37	29	24	23
	9	13	.094	5.11	1047	91	68	55	45	58	43	35	29	
	9	12	.109	5.85	1208	105	79	63	53	67	51	40	34	
22	9	14	.078	4.24	913	83	62	50	41	56	42	34	28	22
	9	13	.094	5.11	1089	99	74	59	49	67	50	40	33	
	9	12	.109	5.85	1265	115	86	69	57	77	58	46	38	
21	9	16	.062	3.39	777	74	55	44	37	52	39	31	26	21
	9	14	.078	4.24	966	92	69	55	46	64	48	38	32	
	9	13	.094	5.11	1145	109	82	65	54	77	58	46	38	
	9	12	.109	5.85	1323	126	95	76	63	89	67	53	44	
20	8	16	.062	3.17	680	68	51	41	34	44	33	27	22	20
	9	16	.062	3.39	810	81	61	49	40	60	45	36	30	
	8	14	.078	3.97	850	85	64	51	42	56	42	33	28	
	9	14	.078	4.24	1010	101	76	61	50	74	55	44	37	
	8	13	.094	4.78	1010	101	76	61	50	66	49	40	33	
	8	12	.109	5.47	1170	117	88	70	58	76	57	46	38	
	9	13	.094	5.11	1200	120	90	72	60	89	67	53	44	
	9	12	.109	5.85	1390	139	104	83	69	102	77	61	51	
19	8	16	.062	3.17	722	76	57	46	38	52	39	31	26	19
	9	16	.062	3.39	855	90	67	54	45	70	52	42	35	
	8	14	.078	3.97	893	94	70	56	47	65	49	39	32	
	9	14	.078	4.24	1064	112	84	67	56	87	65	52	43	
	8	13	.094	4.78	1064	112	84	67	56	77	58	46	38	
	8	12	.109	5.47	1226	129	97	77	64	89	67	53	44	
	9	13	.094	5.11	1264	133	100	80	67	103	77	62	51	
	9	12	.109	5.85	1463	154	115	92	77	120	90	72	60	
18	8	16	.062	3.17	765	85	64	51	42	62	46	37	31	18
	9	16	.062	3.39	909	101	76	61	50	82	61	49	41	
	8	14	.078	3.97	945	105	79	63	52	76	57	46	38	
	9	14	.078	4.24	1125	125	94	75	62	102	76	61	51	
	8	13	.094	4.78	1125	125	94	75	62	91	68	55	45	
	8	12	.109	5.47	1296	144	108	86	72	105	79	63	52	
	9	13	.094	5.11	1332	148	111	89	74	122	91	73	61	
	9	12	.109	5.85	1548	172	129	103	86	141	106	85	70	
17	8	16	.062	3.17	808	95	71	57	47	73	55	44	36	17
	9	16	.062	3.39	960	113	85	68	56	98	73	59	49	
	8	14	.078	3.97	995	117	88	70	59	91	68	54	45	
	9	14	.078	4.24	1190	140	105	84	70	121	91	73	60	
	8	13	.094	4.78	1190	140	105	84	70	108	81	65	54	
	8	12	.109	5.47	1369	161	121	97	80	125	94	75	62	
	9	13	.094	5.11	1411	166	124	100	83	144	108	86	72	
	9	12	.109	5.85	1632	192	144	115	96	167	125	100	83	
16	6	16	.062	2.74	544	68	51	41	34	42	31	25	21	16
	6	14	.078	3.42	672	84	63	50	42	52	39	31	26	
	8	16	.062	3.17	856	107	80	64	53	88	66	53	44	
	9	16	.062	3.39	1016	127	95	76	63	117	88	70	58	
	8	14	.078	3.97	1064	133	100	80	66	109	82	65	54	
	9	14	.078	4.24	1264	158	118	95	79	145	109	87	72	
	8	13	.094	4.78	1264	158	118	95	79	129	97	77	64	
	8	12	.109	5.47	1456	182	136	109	91	149	112	89	74	
	9	13	.094	5.11	1504	188	141	112	94	173	130	104	87	
	9	12	.109	5.85	1736	217	163	130	109	200	150	120	100	

ENGINEERING DATA

SAFE UNIFORM LOAD TABLES FOR STRAN-STEEL JOISTS

TABLE I
ALLOWABLE UNIFORM
TOTAL LOAD
PER SQUARE FOOT
LIMITED BY EITHER
20,000 P.S.I. BENDING STRESS OR 3½" END BEARING, WHICHEVER IS LEAST

TABLE II
UNIFORM LIVE LOAD
PER SQUARE FOOT
BASED ON DEFLECTION OF $\frac{1}{360}$ OF SPAN

SPAN	SIZE OF JOISTS				ONE END REACTION	LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				UNIFORM LIVE LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				SPAN
	DEPTH	GAGE NUMBER	METAL THICK.	WEIGHT PER FT.		12" O.C.	16" O.C.	20" O.C.	24" O.C.	12" O.C.	16" O.C.	20" O.C.	24" O.C.	
FEET	IN.		INCHES	LBS.	LBS.									FEET
15	6	16	.062	2.74	585	78	58	47	39	51	38	31	25	15
	6	14	.078	3.42	720	96	72	58	48	63	47	38	32	
	8	16	.062	3.17	915	122	91	73	61	106	79	64	53	
	9	16	.062	3.39	1087	145	109	87	72	142	106	85	71	
	8	14	.078	3.97	1131	151	113	91	75	132	99	79	66	
	9	14	.078	4.24	1342	179	134	107	89	176	132	106	88	
	8	13	.094	4.78	1342	179	134	107	89	157	118	94	78	
	8	12	.109	5.47	1552	207	155	124	103	181	136	109	90	
	9	13	.094	5.11	1605	214	160	128	107	210	157	126	105	
	9	12	.109	5.85	1853	247	185	148	124	243	182	146	121	
14	6	16	.062	2.74	623	89	67	53	44	63	47	38	31	14
	6	14	.078	3.42	770	110	82	66	55	77	58	46	38	
	8	16	.062	3.17	980	140	105	84	70	131	98	79	65	
	9	16	.062	3.39	1110	159	119	95	79	←				
					[1163]	[166]	[125]	[100]	[83]	←				
	8	14	.078	3.97	1211	173	130	104	86	162	121	97	81	
	9	14	.078	4.24	1442	206	154	124	103	←				
	8	13	.094	4.78	1442	206	154	124	103	193	145	116	96	
	8	12	.109	5.47	1666	238	178	143	119	223	167	134	111	
	9	13	.094	5.11	1715	245	184	147	122	←				
	9	12	.109	5.85	1988	284	213	170	142	←				
13	6	16	.062	2.74	669	103	77	62	51	78	58	47	39	13
	6	14	.078	3.42	832	128	96	77	64	97	73	58	48	
	8	16	.062	3.17	1053	162	121	97	81	←				
	9	16	.062	3.39	1110	171	128	102	85	←				
					[1253]	[193]	[145]	[116]	[96]	←				
	8	14	.078	3.97	1306	201	151	121	100	←				
	9	14	.078	4.24	1553	239	179	143	119	← LOADS GIVEN IN TABLE I WILL NOT PRODUCE DEFLECTIONS EXCEEDING $\frac{1}{360}$ OF SPAN				
	8	13	.094	4.78	1553	239	179	143	119	←				
	8	12	.109	5.47	1794	276	207	165	138	←				
	9	13	.094	5.11	1846	284	213	170	142	←				
	9	12	.109	5.85	2138	329	247	197	164	←				
12	6	16	.062	2.74	726	121	91	73	60	99	74	59	49	12
	6	14	.078	3.42	900	150	125	90	75	123	92	74	61	
	8	16	.062	3.17	1110	185	139	111	93	←				
					[1142]	[190]	[143]	[114]	[95]	←				
	9	16	.062	3.39	1110	185	139	111	93	←				
					[1357]	[226]	[170]	[136]	[113]	←				
	8	14	.078	3.97	1416	236	177	142	118	←				
	9	14	.078	4.24	1660	277	208	166	138	←				
					[1682]	[280]	[210]	[168]	[140]	← LOADS GIVEN IN TABLE I WILL NOT PRODUCE DEFLECTIONS EXCEEDING $\frac{1}{360}$ OF SPAN				
	8	13	.094	4.78	1682	280	210	168	140	←				
	8	12	.109	5.47	1944	324	243	194	162	←				
	9	13	.094	5.11	2004	334	250	200	167	←				
	9	12	.109	5.85	2316	386	290	232	193	←				
11	6	16	.062	2.74	792	144	108	86	72	129	97	77	64	11
	6	14	.078	3.42	979	178	133	107	89	159	119	95	80	
	8	16	.062	3.17	1110	202	151	121	101	←				
					[1225]	[226]	[170]	[136]	[113]	←				
	9	16	.062	3.39	1110	202	151	121	101	←				
					[1481]	[269]	[202]	[162]	[135]	←				
	8	14	.078	3.97	1540	280	210	168	140	←				
	9	14	.078	4.24	1660	302	226	181	151	←				
					[1835]	[334]	[250]	[200]	[167]	← LOADS GIVEN IN TABLE I WILL NOT PRODUCE DEFLECTIONS EXCEEDING $\frac{1}{360}$ OF SPAN				
	8	13	.094	4.78	1835	334	250	200	167	←				
	8	12	.109	5.47	2123	386	289	232	193	←				
	9	13	.094	5.11	2183	397	298	238	198	←				
	9	12	.109	5.85	2525	459	345	276	230	←				

[—] VALUES ENCLOSED IN BRACKETS MAY BE USED IF JOIST WEBS ARE PROPERLY STIFFENED AT REACTIONS WITH STRAN STEEL CHANNELS OR HALF STUD SECTIONS WELDED TO JOIST WEBS

ENGINEERING DATA
SAFE UNIFORM LOAD TABLES FOR STRAN-STEEL JOISTS

TABLE I — ALLOWABLE UNIFORM TOTAL LOAD PER SQUARE FOOT LIMITED BY EITHER 20,000 P.S.I. BENDING STRESS OR 3 1/2" END BEARING, WHICHEVER IS LEAST

TABLE II — UNIFORM LIVE LOAD PER SQUARE FOOT BASED ON DEFLECTION OF 1/360 OF SPAN

SPAN	SIZE OF JOISTS				ONE END REACTION	LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				UNIFORM LIVE LOAD IN POUNDS PER SQ. FT. FOR VARIOUS JOIST SPACINGS				SPAN
	DEPTH	GAGE NUMBER	METAL THICK.	WEIGHT PER FT.		12" O.C.	16" O.C.	20" O.C.	24" O.C.	12" O.C.	16" O.C.	20" O.C.	24" O.C.	
FEET	IN.		INCHES	LBS.	LBS.									FEET
10	6	16	.062	2.74	875	175	131	105	87	172	129	103	86	10
	6	14	.078	3.42	1080	216	162	130	108	212	159	127	106	
	8	16	.062	3.17	1110	222	167	133	111					
					[1370]	[274]	[205]	[164]	[137]					
	9	16	.062	3.39	1110	222	167	133	111					
					[1629]	[326]	[244]	[195]	[163]					
	8	14	.078	3.97	1660	332	249	199	166	LOADS GIVEN IN TABLE I WILL NOT PRODUCE DEFLECTIONS EXCEEDING 1/360 OF SPAN				
	9	14	.078	4.24	1660	332	249	199	166					
	8	13	.094	4.78	2020	404	303	242	202					
	9	13	.094	5.11	2310	462	347	277	231					
	8	12	.109	5.47	2335	467	350	280	233					
9	6	16	.062	2.74	967	215	161	129	107					9
	8	16	.062	3.17	1110	247	185	148	123					
					[1522]	[338]	[254]	[203]	[169]					
	9	16	.062	3.39	1110	247	185	148	123					
					[1810]	[402]	[302]	[241]	[201]					
	6	14	.078	3.42	1197	266	199	160	134					
	8	14	.078	3.97	1660	367	275	221	183					
	9	14	.078	4.24	1660	367	275	221	183					
8	6	16	.062	2.74	1092	273	205	164	136					8
	8	16	.062	3.17	1110	278	208	166	139					
	9	16	.062	3.39	1110	278	208	166	139					
	6	14	.078	3.42	1348	337	253	202	168					
	8	14	.078	3.97	1660	415	311	249	207					
	9	14	.078	4.24	1660	415	311	249	207					
7	6	16	.062	2.74	1110	317	238	190	159					7
	8	16	.062	3.17	1110	317	238	190	159					
	6	14	.078	3.42	1540	440	330	264	220					
	8	14	.078	3.97	1660	474	356	285	237					
6	6	16	.062	2.74	1110	370	278	222	185					6
	8	16	.062	3.17	1110	370	278	222	185					

[ ] VALUES ENCLOSED IN BRACKETS MAY BE USED IF JOIST WEBS ARE PROPERLY STIFFENED AT REACTIONS WITH STRAN STEEL CHANNELS, OR HALF STUD SECTIONS WELDED TO JOIST WEBS.

STUD SECTIONS USED AS JOISTS

12	3 5/8"	16	.062	2.28	354	59	44	35	29	29	22	17	14	12
11	3 5/8"	16	.062	2.28	390	71	53	42	35	38	28	23	19	11
10	2 5/16"	16	.062	1.73	225	45	34	27	22	17	13	10	8	10
	3 5/8"	16	.062	2.28	425	85	64	51	42	51	38	31	25	
9	2 5/16"	16	.062	1.73	252	56	42	34	28	24	18	14	12	9
	3 5/8"	16	.062	2.28	477	106	79	63	53	70	52	42	35	
8	2 5/16"	16	.062	1.73	284	71	53	43	35	34	25	20	17	8
	3 5/8"	16	.062	2.28	536	134	100	80	67	99	74	59	49	
7	2 5/16"	16	.062	1.73	325	93	69	56	46	50	37	30	25	7
	3 5/8"	16	.062	2.28	609	174	130	104	87	148	111	89	74	
6	2 5/16"	18	.050	1.39	267	89	67	53	44	63	47	38	31	6
	2 5/16"	16	.062	1.73	378	126	94	75	63	80	60	48	40	
	3 5/8"	16	.062	2.28	711	237	178	142	119	235	176	141	117	
5	2 5/16"	18	.050	1.39	320	128	96	77	64	110	82	66	55	5
	2 5/16"	16	.062	1.73	452	181	136	109	90	137	103	82	68	
	3 5/8"	16	.062	2.28	855	342	256	205	171					
4	2 5/16"	18	.050	1.39	400	200	150	120	100					4
	2 5/16"	16	.062	1.73	566	283	212	170	141	268	201	161	134	

TABLE III

MAXIMUM ALLOWABLE REACTIONS
AND CONCENTRATED LOADS ON JOISTS
WITHOUT WEB STIFFENERS IN ACCORDANCE
WITH A.I.S.I. SPECIFICATION - SECTION 3.5
"WEB CRIPPLING OF BEAMS"

LENGTH OF BEARING B	LOAD ON OUTER END OF CANTILEVER OR SIMPLE END REACTION FOR 6", 8", AND 9" JOISTS				INTERIOR CONCENTRATED LOAD OR INTERNAL REACTION OF CONTINUOUS BEAM FOR 6", 8" AND 9" JOISTS			
	16 GA.	14 GA.	13 GA.	12 GA.	16 GA.	14 GA.	13 GA.	12 GA.
INCHES	LB.	LB.	LB.	LB.	LB.	LB.	LB.	LB.
2	980	1470	2060	2710	1910	2830	3920	5090
2 1/2	1020	1540	2150	2820	2030	3010	4150	5380
3	1070	1600	2240	2920	2140	3170	4370	5640
3 1/2	1110	1660	2310	3010	2240	3320	4560	5880
3 3/4	1120	1690	2340	3060	2290	3390	4650	6000
4	1140	1710	2380	3100	2340	3450	4740	6100

FOR OTHER LENGTHS OF BEARING USE THE FOLLOWING FORMULAS

$P_{MAX.} = t^2 f_b (7.4 + 0.93\sqrt{B/t})$ | $P_{MAX.} = t^2 f_b (11.1 + 2.41\sqrt{B/t})$

P = CONCENTRATED LOAD OR REACTION IN POUNDS
t = WEB THICKNESS IN INCHES
B = LENGTH OF BEARING IN INCHES
f_b = BASIC DESIGN STRESS IN POUNDS PER SQ. IN.

TABLE IV

MAXIMUM ALLOWABLE
AXIAL LOADS FOR STUDS
WITH WALL MATERIAL ATTACHED TO BOTH FLANGES
IN ACCORDANCE WITH A.I.S.I. SPECIFICATIONS SECTION 3.6
"AXIALLY LOADED COMPRESSION MEMBERS"

SECTION	LENGTH	L/r MAJOR AXIS 1-1	ALLOWABLE STRESS LBS. PER SQ IN.	ALLOWABLE LOAD POUNDS
3 5/8 X 16 GA.	13'-0"	118	9626	6350
	12'-0"	109	10937	7220
	11'-0"	99	12272	8100
	10'-0"	90	13363	8820
	9'-0"	81	14350	9470
	8'-0"	72	15234	10050
2 5/16 X 16 GA.	9'-0"	122	9010	4500
	8'-6"	115	10075	5040
	8'-0"	108	11076	5540
2 5/16 X 18 GA.	9'-0"	122	8954	3580
	8'-6"	115	9797	3920
	8'-0"	108	10590	4240
2" X 20 GA.	9'-0"	140	6837	1690
	8'-6"	132	7693	1900
	8'-0"	125	8432	2080

FOR OTHER LENGTHS AND SECTIONS USE THE FOLLOWING FORMULAS

L/r LESS THAN $120/\sqrt{Q}$; ALLOWABLE COMPRESSIVE STRESS IS

$18560\,Q - .6416\,Q^2 \left(\frac{L}{r}\right)^2$ IN LBS. / SQ. INCH

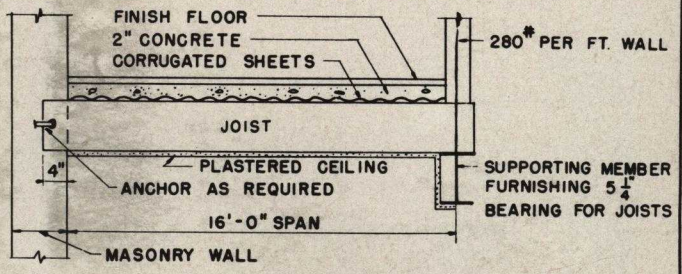
L/r GREATER THAN $120/\sqrt{Q}$; ALLOWABLE COMPRESSIVE STRESS IS

$$\frac{134{,}000{,}000}{(L/r)^2}$$ IN LBS. / SQ. INCH

ALLOWABLE LOAD EQUALS
ALLOWABLE COMPRESSIVE STRESS X AREA

L = UNSUPPORTED LENGTH IN INCHES
r = LEAST RADIUS OF GYRATION FROM PROPERTY TABLE
Q = COLUMN FACTOR AS GIVEN IN PROPERTY TABLE

JOIST DESIGN EXAMPLE



TO USE LOAD TABLES FOLLOW PROCEDURE
OUTLINED IN FOLLOWING EXAMPLE

ASSUME LOAD PER SQUARE FOOT

FLOOR FINISH	= 1#
2" CONCRETE SLAB	= 24#
CORRUGATED SHEETS	= 1#
JOISTS	= 2#
PLASTER CEILING	= 8#
TOTAL DEAD LOAD	= 36#
LIVE LOAD	= 40#
TOTAL LOAD	= 76#

ENTERING TABLE I THE FOLLOWING JOISTS COULD BE USED WHICH WOULD SATISFY THE TOTAL LOAD REQUIREMENTS.
9"-14 GA. 24" ON CENTERS GOOD FOR 79 LBS.
9"-16 GA. 20" ON CENTERS GOOD FOR 76 LBS.
8"-14 GA. 20" ON CENTERS GOOD FOR 80 LBS.
8"-16 GA. 16" ON CENTERS GOOD FOR 80 LBS.
IN GENERAL STRAN STEEL JOISTS ARE MOST ECONOMICALLY SPACED AT 24" CENTERS; THEREFORE 9"-14 GA. JOISTS AT 24" CENTERS ARE SELECTED.

ENTERING TABLE II IT IS FOUND THAT. 9"-14 GA. JOISTS AT 24" O.C. WILL SAFELY SUPPORT A LIVE LOAD OF 72 LBS. PER SQ. FT. WITHOUT EXCEEDING DEFLECTION REQUIREMENTS. IN AS MUCH AS THE LIVE LOAD IS ONLY 40 LBS. PER SQ. FT. 9"-14 GA. JOISTS ARE ADEQUATE. THUS, THE JOISTS SATISFY BOTH STRESS AND DEFLECTION REQUIREMENTS.

TO CHECK WEB CRIPPLING OF JOISTS AT REACTIONS USE TABLE III

LEFT END REACTION
REACTION FROM TOTAL LOAD ON JOISTS = $76 \times 2 \times \frac{16}{2}$ = 1216#
ALLOWABLE REACTION FOR 14 GA. ON 4" BEARING IS 1710#

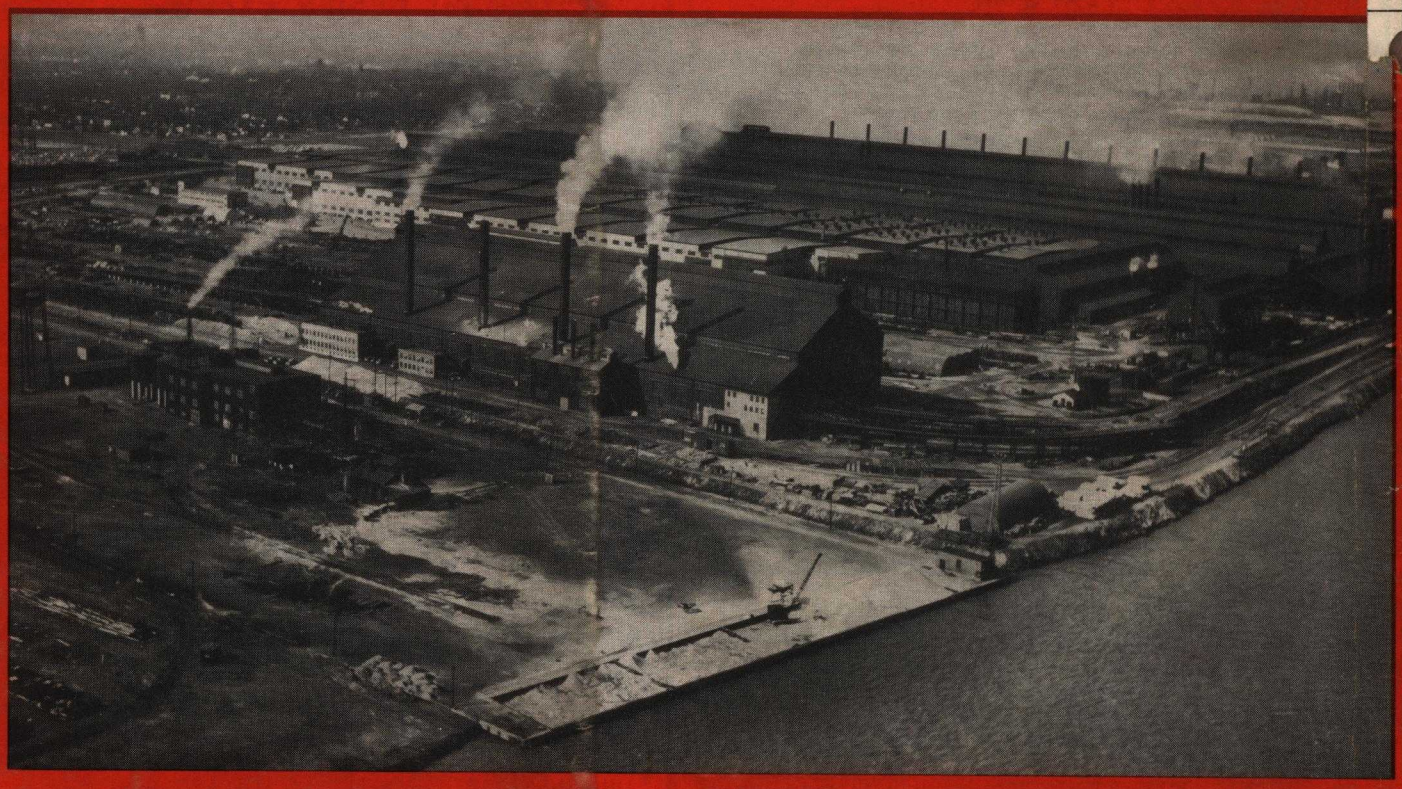
RIGHT END REACTION
REACTION FROM TOTAL LOAD ON JOISTS = 1216#
CONCENTRATED LOAD DIRECTLY ABOVE SUPPORT = 280×2 = 560
TOTAL REACTION = 1776#

ALLOWABLE REACTION FOR 14 GA. ON 5 1/4" BEARING IS FOUND BY USING THE FOLLOWING FORMULA FROM TABLE III

$$= t^2 f_b \left(7.4 + 0.93\sqrt{B/t}\right)$$

$$= .078^2 \times 20{,}000 \left(7.4 + 0.93\sqrt{\frac{5.25}{.078}}\right) = 1830\#$$

NOTE:
IF EITHER END REACTION HAD EXCEEDED THE ALLOWABLE A WEB STIFFENER WOULD BE REQUIRED.
THUS 9" X 14 GA. SPACED 24" O.C. WILL SATISFY ALL REQUIREMENTS.



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